SCIENTIFIC SERIALS.

Bulletin of the American Mathematical Society, vol. i. No. 7, (April 1895).—"Riemann and his significance for the development of modern mathematics," is the translation, by A. Ziwet, of an address delivered by Prof. F. Klein at the general session of the Versammlung Deutscher Naturforscher und Aerzte in Vienna, September 27, 1894. In it the author attempts to give an idea of the life-work of Bernhard Riemann, "a man who more than any other has exerted a determining influence on the development of modern mathematics."—Prof. Cajori contributes a note on the multiplication of semi-convergent series, in which, following up his work in a recent number of the *Bulletin*, he further extends results arrived at by Pringsheim (*Math. Ann.* vol. xxi. pp. 327-378) and by A. Voss (*Math. Ann.* vol. xxiv. pp. 42-47).—Mr. L. E. Dickson discusses Gergonne's Pile Problem (*cf.* Ball's "Recreations," pp. 101-6), and points out one or two slight inaccuracies in a proof given by Dr. C. T. Hudson in *Educational Times* Reprints, vol. ix. pp. 89-91.—Prof. Ziwet gives an account of the Repertoire bibliographique des Sciences Mathematiques, *i.e.* a card catalogne of mathematical literature which has been widely circulated amongst mathematicians. Notes, and new publications, as usual, close the number.

Bulletin de l'Académie Royale de Belgique, No. 3.—On Chandler's formulæ, by F. Folie. The author criticises the latest formula enunciated by Chandler for the variation of latitude. Even when compared with the Strassburg observations, which most closely accord with the formula, it is evident that the periods are not correctly rendered. The constants in the formula require further empirical research.—On the equations of the physical field, by Ch. Lagrange. The form, *i.e.* the law of distribution of a quantity of matter round its centre of inertia, constitutes in physics a principle as important as the quantity of matter itself, or its mass. Besides the principle of concentration, there is a principle of direction, and the latter is as important as the former. The author investigates the equations of motion in a medium consisting of rigid points, and introduces the conception of axial matter (*matière axée*), in which account is taken not only of the mass of a point, but also of all the qualities depending upon the shape of the mass. The density of a point is simply the intensity of one of the parameters determining its action, but a large number of other parameters of known form remain to be considered. The consideration of axial matter leads in a manner analogous to that which obtains in Kelvin's theory of the intensity of magnetisation, to theorems upon wires, plates, and leaves of similar substance, and then upon bodies made up of these structures.—On the colour, density, and surface tension of hydrogen peroxide, by W. Spring. This substance, which is highly explosive in the anhydrous state, has a blue colour when seen in a thickness of 100 cm. The colour resembles that of water, but is 1·83 times as intense. The density of the anhydrous substance is 1·4996. When 60·0445 gr. of it are contained in 100 cc. of an aqueous solution, the density is 1·2540. The surface tension is 0·456, that of water being 1. The addition of 6·4 per cent. water raises the surface tension by 102·5 per cent.—Action of certain hot gases upon red phosphorus, by A. J. J. Vandevelde. Retger's supposition that phosphamine is produced by passing hot hydrogen over red phosphorus is not correct. Vapour of phosphorus is formed and carried off by the hot gas, exhibiting the phenomenon of spontaneous combustion on emerging into the air. Other hot gases, such as nitrogen, CO_2, CO, SH_2 and dry HCl gave rise to the same phenomenon.

Wiedemann's Annalen der Physik und Chemie, No. 4.—On luminescence, by Eilhard Wiedemann and G. C. Schmidt. An important distinction must be drawn between luminescence due to physical and that due to chemical causes. A prolonged afterglow makes the presence of chemical luminescence very probable. Thermoluminescence occurs after the body has been exposed to a temperature far below incandescence. A phenomenon now called "lyoluminescence" occurs with some substances during solution, when they have been previously exposed to strong light. The authors show that luminescence under cathode rays is always accompanied by chemical action. Mixtures of calcium and manganese salts show luminescence phenomena of great brilliance under cathode rays, and when subsequently heated.—On normal and anomalous dispersion of electric waves, by L. Graetz and L. Fomm. The dielectric constant and the conductivity of a body are not perfectly independent quantities, but are connected by the constitution of the body in a manner similar to that in which refraction and absorption are connected in optics.—Magnetisation of iron by very small forces, by Werner Schmidt. Steel obeys very small magnetising forces more rapidly than iron. The limit of proportionality between magnetising forces and magnetic moment may with practically sufficient accuracy be placed at a field intensity of 0·06.—Otto von Guericke's original air pump, by G. Berthold. The pump in the Royal Library at Berlin cannot be considered as Guericke's original air pump, since the latter was bought by the Archduke of Saxony, and taken to Sweden by Dr. Heraeus, where it was used as late as 1726 as a lecture instrument. When last heard of, in 1734, it was in charge of the Professor of Mathematics at Lund.—Remarks upon Mack's paper on the double refraction of electric rays, by Wilhelm von Bezold. The different behaviour of wood towards electric radiation along and across the fibre may be shown in a variety of ways. Lichtenberg's figures on wooden plates cut along the fibre show an elliptical shape, like doubly refracting crystals. A similar phenomenon is exhibited by a plate of ebonite rendered anisotropic by sticking strips of tinfoil parallel to each other on the other side. The production of a doubly refracting or even a circularly polarising body for electric rays by embedding conducting rods in a suitable dielectric does not appear to be hopeless.

THE only article of general interest in the *Nuovo Giornale Botanico Italiano* for April is one by Dr. U. Brizi, on the disease of the vine known as *brunissure* or blackening. The plasmode found in the diseased cells of the leaves cannot, he considers, be properly referred to *Plasmodiophora*, as has been done by most authorities hitherto. It belongs to an organism which appears rather to present characters intermediate between the Myxomycetes and the Amœbæ.

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, April 25.—Mr. A. G. Vernon Harcourt, President, in the chair.—The following papers were read:—Action of nitroxyl on amides, by W. A. Tilden and M. O. Forster. The interaction of nitroxyl chloride and amides usually results in the exchange of the amidogen group for an atom of chlorine.—Action of nitrosyl chloride on asparagine and aspartic acid; formation of lævorotatory chlorosuccinic acid, by W. A. Tilden and B. M. C. Marshall. Asparagine and nitroxyl chloride interact with formation of lævo-chlorosuccinic acid.—A property of the non-luminous atmospheric coal-gas flame, by L. T. Wright.—Diortho-substituted benzoic acids. (1) Substituted benzoyl chlorides, by J. J. Sudborough.—Diortho-substituted benzoic acids. (2) Hydrolysis of aromatic nitriles and acid amides, by J. J. Sudborough. In these two papers the author describes a number of new nitro- and bromo-benzoyl chlorides and benzoic acids.—Note on the action of sodium ethylate on deoxybenzoïn, by J. J. Sudborough. When deoxybenzoïn and sodium ethoxide are heated together, stilbene and hydroxydi-benzyl are produced.—A constituent of Persian berries, by A. G. Perkin and J. Geldard. In addition to the substances previously isolated from Persian berries, the authors have obtained aquercitin dimethyl ether which they term rhamnazin.—Potassium nitrososulphate, by E. Divers and T. Haga. The potassium nitrososulphates, by described Hantzsch, and by Raschig, seem to be identical with that first prepared by Pelouze.—The milk of the gamoose, II., by H. D. Richmond.

May 2.—Studies on the constitutions of the tri-derivatives of naphthalene. No. 10, the dichloro-α-naphthols and trichloronaphthalenes from 3 : 4-dichlorophenyl-1-isocrotonic acid. No. 11, the trichloronaphthalene derivable from Cleve's 1 : 2 : 2-α-nitrochloronaphthalenesulphonic chloride. No. 12, the trichloronaphthalene, derivable from Alén's α-nitronaphthalene-2 : 2′-disulphonic chloride. No. 13, the α-naphthylamine-2 : 2′-disulphonic acid of Freund's German Patent, 27346. No. 14, the fourteen isomeric trichloronaphthalenes. The non-existence of a trichloronaphthalene melting at 75·5°: the formation of chloro-derivatives from sulphonic chlorides, by H. E. Armstrong and W. P. Wynne. In these six papers the authors describe thirteen out of the fourteen possible isomeric trichloronaphthalenes, together with a large number of compounds obtained during the preparation of these halogen derivatives.—The solubilities of gases in water under varying pressure, by E. P. Perman. Henry's law holds for chlorine, bromine, carbon dioxide, and hydrogen sulphide, but large deviations are observed with ammonia, hydrogen chloride, and sulphur dioxide.—The existence of hydrates and of double compounds in solution.

Part 1, by E. P. Perman. From experiments on the pressure of gases dissolved in various solutions the author concludes that sodium sulphate exists in aqueous solution as the hydrate $Na_2SO_4,10H_2O$, and that silver chloride exists in ammoniacal aqueous solutions as the compound $AgCl,3NH_3$.—Derivatives of π-bromocamphoric acid, by F. S. Kipping.—Paraheptyltoluene and its derivatives, by F. S. Kipping and O. F. Russell.—Note on the formation of a phosphate of platinum, by R. E. Barnett. On passing phosphorus pentoxide vapour and oxygen over red-hot platinum, a yellow phosphate PtP_2O_7, insoluble in aqua regia, is obtained.

Linnean Society, May 2.—Mr. C. B. Clarke, President, in the chair.—Dr. O. Nordstedt of Lund, Dr. Rudolph Philipppi of Santiago, and Dr. M. Woronin of St. Petersburg, were elected foreign members.—Mr. H. M. Bernard showed under the microscope the circumscribed patches of setæ above and below the stigmatæ on the pupa of the vapourer moth (*Orygia antiqua*). The arrangement suggested a vanished notopodium just where, in the Hexapods, a dorsal branch of a parapodium ought to have vanished, according to the exhibitor's method of deducing the different groups of the Arthropoda from their Annelidan ancestors, as sketched in his recent paper on the *Galeodidæ*.—Mr. E. M. Holmes exhibited some new British Algæ from Dorsetshire and Surrey; amongst others, *Uluella confluens* and *Ectocarpus Reinholdi*, both discovered last month at Weymouth, and the latter previously known only from the Baltic.—Mr. J. E. Harting exhibited and made remarks on a specimen of *Cuculus canorus* in the rare hepatic plumage (*Cuculus hepaticus*, Sparrman), recently obtained at Bishop's Waltham, Essex.—Mr. W. T. Thiselton-Dyer, C.M.G., then gave an abstract of a paper by the late Mr. John Ball, F.R.S., on the distribution of plants on the southern side of the Alps, prefaced by some account of the author's life, and special work in relation to the Alpine flora.

Mathematical Society, Thursday, May 9.—Major P. A. Macmahon, R.A., F.R.S., President, in the chair.—Dr. Hobson, F.R.S., made a communication on the most general solution of given degree of Laplace's equation.—Prof. M. J. M. Hill, F.R.S., read two short notes: (1) a property of a skew determinant; (2) on the geometrical meaning of a form of the orthogonal transformation.—Prof. Greenhill, F.R.S., and Mr. T. I. Dewar gave an account of results relating to the spherical catenary. The investigations given in NATURE, p. 262, January 10, 1895, when the parameter of the associated elliptic integral of the third kind is of the form $4\omega_3/\mu$, where ω_3 is the imaginary period and μ is an integer, worked out in detail for $\mu = 3, 4, 5$, and 8, have been extended by Mr. Dewar to the cases of $\mu = 6, 7, 9, 10$, and 12.

In particular, when $\mu = 10$, the catenary is given by an equation of the same form as for $\mu = 5$,

$$(1 - z^2)^{\frac{5}{2}} e^{5\chi i} = Hz^5 + H_1z^4 + H_2z^3 + H_3z^2 + H_4z + H_5 \\ + i(Lz^3 + L_1z^2 + L_2z + L_3)\sqrt{Z},$$

where

$$Z = (1 - z^2)(z - h)^2 - A^2,$$

and

$$\chi = \psi - p\int Z^{-\frac{1}{2}}dz;$$

and it was found that p could be made to vanish, so that the catenary becomes a closed algebraical curve on the sphere, by taking

$$h = \frac{1}{2}\sqrt{\frac{17}{3}},\ A = -\frac{1}{10}\sqrt{\frac{5}{3}},\ L = -\frac{5}{6}\sqrt{\frac{5}{3}},$$

$$L_1 = -\frac{5}{36}\sqrt{85},\ L_2 = \frac{35}{72}\sqrt{\frac{5}{3}},\ L_3 = \frac{13}{144}\sqrt{85};$$

$$H = \frac{1}{6}\sqrt{\frac{17}{3}},\ H_1 = 0,\ H_2 = -\frac{5}{12}\sqrt{\frac{17}{3}},\ H_3 = -\frac{25}{108},$$

$$H_4 = \frac{65}{288}\sqrt{\frac{17}{3}},\ H_5 = \frac{25}{144}.$$

A model was exhibited of this spherical catenary, formed by a chain wrapped on a terrestrial globe; and so far this appears to be the only real algebraical case, for which it is possible for p to vanish.—Mr. G. Heppel exhibited a set of Napier's Bones, of date 1746, and explained how they were used in calculations, referring for a further description of them to the *English Cyclopædia*.—The following papers, in the absence of their authors, were taken as read:—On those orthogonal substitutions that can be generated by the repetition of an infinitesimal orthogonal substitution, by Dr. H. Taber.—Notes on the theory of groups of finite order (continuation), by Prof. W. Burnside, F.R.S.—Applications of trigraphy, by Mr. J. W. Russell; and the reciprocators of two conics, by Messrs. J. W. Russell and A. E. Jolliffe.

Zoological Society, May 7.—Sir W. H. Flower, K.C.B., F.R.S., President, in the chair.—A letter was read from Dr. F. A. Jentink, concerning a monkey lately described as *Cercocebus aterrimus*, of which the type had lately been acquired by the Leyden Museum. Dr. Jentink considered this monkey to be the same as *Cercocebus albigena*, Gray.—Mr. J. H. Gurney exhibited and made remarks on a rare kingfisher (*Alcedo beavani*) obtained in Ceylon by Mr. A. L. Butler.—Mr. G. F. Scott Elliot made some remarks on the fauna of Mount Ruwenzori, in British Central Africa. Mr. Scott Elliot stated that elephants occur in great numbers on the east side of Ruwenzori. There were also many still living and vast stores of ivory in the Congo Free-State, just beyond the south-west corner of the English sphere of influence. He pointed out the presence of the hippopotamus in the Albert-Edward Nyanza, and its extraordinary abundance in the Kagera River. The rhinoceros was found frequently in the country of Karagwe, usually near the marshy lakes leading to the Kagera.—On the alluvial plains about the east of Ruwenzori, Jackson's hartebeest (*Bubalis jacksoni*), the kob (*Cobus kob*), and another waterbuck (perhaps of a new species) were common. No buffaloes were seen. A bushbuck also occurred on Ruwenzori from 7000 to 8000 feet. Of monkeys, Mr. Scott Elliot had noticed the presence of a black and white *Colobus*, which he could not identify, and of at least two other species, probably a *Cercopithecus* and a baboon. Some small mice brought home had not yet been identified. Leopards were numerous, and lions were also common on the lower grounds. Two species of sunbird were brought back, one of which ascends to 11,000 feet on Ruwenzori. Mr. Scott Elliot concluded by remarking that the general idea of distribution gathered from the flora seemed to confirm such data as he could gather from the fauna of the country which he traversed during his journey.—Mr. F. E. Beddard, F.R.S., and Mr. P. Chalmers Mitchell made a communication on the structure of the heart in the alligator, as observed in specimens that had died in the Society's menagerie.—Mr. Chalmers Mitchell described the anatomy of the crested screamer (*Chauna chavaria*), pointing out some resemblances between the alimentary canal of that bird and the ostrich, and giving a detailed comparison of the structures of *Chauna chavaria* and *Palamedea cornuta*.—A communication was read from Dr. Percy Rendall, containing field-notes on the antelopes of the Transvaal.—Dr. Mivart, F.R.S., read a paper on the skeleton of *Lorius flavopalliatus* as compared with that of *Psittacus erithacus*.

Geological Society, May 8.—Dr. Henry Woodward, F.R.S., President, in the chair.—The Stirling dolerite, by Horace W. Monckton. The rock described in the paper forms a mass of about eight miles in length, with an average width of about a mile; it is intruded into the lower part of the carboniferous limestone series. There is little doubt that the Abbey Craig rock, north of the Forth, is connected with the Stirling rock; and there is reason to think that the igneous rocks of Cowden Hill and of the hills around Kilsyth are outlying portions of the Stirling rock, being connected with it underground. All these patches, as well as the main mass, are for the most part composed of a more or less coarse-grained dolerite, the marginal part always becoming finer-grained, whilst the actual edge has apparently been a tachylyte now devitrified. The author gave the results of his macroscopic and microscopic examination of the rocks from various parts of the mass.—Notes on some railway cuttings near Keswick, by J. Postlethwaite. Several cuttings have recently been made on the Cockermouth, Keswick, and Penrith Railway, chiefly through drift, though some occur in the Skiddaw slates, and in one case a diabase dyke (much decomposed) was met with. The author described the drifts as blue clay beneath, and brown clay above, and considered that these two clays were produced during two separate periods of glaciation, with no long interval between. In some places near Keswick water-borne gravel may be seen surmounted by blue clay; this gravel was considered by the author to be of fluviatile origin.—The shelly clays and gravels of Aberdeenshire considered in relation to the question of submergence, by Dugald Bell. The drifts of this region have been described by Mr. Jamieson, and also in the publications of the Geological Survey. The two authorities agree that the lower (grey) boulder clay of the district was produced by a local glaciation. The geological surveyors, however, maintain that the intervening sands and gravels with marine shells were produced during a submergence of 500 feet or upwards, whilst the upper (red) boulder clay was formed by an ice-sheet from the south. Mr. Jamieson, on the other hand, assigns a purely glacial origin to the middle sands and gravels, and considers that the red clay (which contains a few fragments of marine shells) indicates a submergence. The author discussed these views, and maintained that submergence is not proved in the case of either middle gravels or red clay, but that the former are, as Mr. Jamieson maintained, truly glacial, whilst he advocated the existence of extra-morainic lakes to explain the latter.

PARIS.

Academy of Sciences, May 13.—M. Marey in the chair.—On the cœlostat, a mirror apparatus giving an image of the sky which remains fixed with regard to the earth, by M. G. Lippmann. A plane mirror is mounted on an axis resting on fixed bearings. The mirror and its axis are parallel to the polar axis. A motor turns the system at a uniform speed once round in forty-eight sidereal hours, in the same direction as that of the celestial sphere. The author gives a proof that this mirror fulfils the necessary conditions, and points out wherein it differs from the ordinary siderostat. He shows how the siderostat can be used to demonstrate the principle of the cœlostat, and how the latter instrument can be employed in place of an equatorial.—Thermochemical relations between the isomeric forms of ordinary glucose, by M. Berthelot. Three forms of glucose are distinguished: α, the ordinary form, for which $\alpha_D = +106°$; β, produced by transformation of α at 100°, giving $\alpha_D = +52·5°$; and γ, formed from α at 110°, having $\alpha_D = +22°·5$. These rotations are observed immediately on solution; left for some time all are converted into the β form in solution. The change of α into β glucose absorbs 1·55 Cal., the corresponding change of γ into β glucose absorbs 0·67 Cal., in the anhydrous state.—On an automatic registering measuring machine for the comparison of end measures, by M. L. Hartmann.—Researches on the hatching of "l'œuf des sexués" of the vine Phylloxera, by M. L. J. Leroux.—The works printed in the correspondence are: A necrological notice on Ernest Mallard, by M. A. de Lapparent. Petroleum, asphalt, and bitumen, from the geological point of view, by M. A. Jaccard. Invasions of locusts in Algeria, by M. J. Künckel d'Herculais.—Demonstration of Tchébychef's theorem, by M. André Markoff.—On the equivalence of six different forms of expression of the quadratures of algebraical differentials reducible to elliptic integrals, by M. F. de Salvert.—On the integration of the system of differential equations, by M. A. J. Stodolkievitz.—On a new method for the production of fringes with great differences of phase, by M. Gouy. A theoretical paper.—On the electromagnetic theory of the absorption of light in crystals, by M. Bernard Brunhes.—Anomalous rotatory dispersion of absorbent bodies, by M. A. Cotton.—General solution of Maxwell's equations for a homogeneous and isotropic absorbent medium, by M. Birkeland.—On argon and helium. An extract from a letter by Prof. Ramsay to M. Berthelot. An account is given of a sample of gas obtained from a meteoric iron from Augusta County, Virginia, U.S.A. After sparking with oxygen and over caustic soda, the residual gas gave spectroscopic evidence of the presence of argon and helium. Only the lines of argon and helium were observed. This evidence is taken as proof that argon exists in extra-terrestrial bodies, though it has not been noticed in the sun. Helium is found in most of the rare earth minerals examined by Prof. Ramsay.—On the definite combination in copper-aluminium alloys, by M. H. Le Chatelier. The author corrects his previous announcement of the alloy AlCu. The substance had been more profoundly altered by the reagents used than was at the time suspected.—Estimation of sulphur in cast-irons, steels, and irons, by M. Louis Campredon.—Researches on mercurous chloride, bromide, iodide, and oxide, by M. Raoul Varet. A thermochemical paper giving details concerning the heats of formation of these salts.—On the molecular origin of the absorption bands of cobalt and chromium salts, by M. A. Étard. The conclusions are drawn:—(1) That chromium salts and the red cobalt salts have fine spectroscopic bands, just as is the case with the rare earths and uranium salts. (2) That these are spectra of molecules like the spectra given by organic substances of the chlorophyll type. (3) The hypothesis that each band of the spectrum of a rare earth corresponds to an element is not necessarily true, according to the evidence of cobalt. (4) The bands may be displaced or disappear for one and the same element according to the nature of the molecules in solution or of the compound observed.—On the molecular modifications of glucose, by M. C. Tanret.—On the use of carbon tetrachloride as a means of separating methylene from ethyl alcohol, by M. Maxime Cari-Mantrand.—On a brown pigment in the elytra of *Curculio cupreus*, by M. A. B. Griffiths.—On the aeration of the soil in the Paris promenades and plantations, by M. Louis Mangin.—On the existence of numerous crystals of orthoclase felspar in the chalk of the Paris basin; proofs of their genesis *in situ*, by M. L. Cayeux.—On gypsum from the neighbourhood of Serres (Hautes-Alpes) and Nyons (Drôme), by M. Victor Paquier.—On the miocene near Bourgoin and Tour-du-Pin, by M. Henri Douxami.—On the presence of *Ostrea (Exogyra) virgula* in the upper Jurassic of the Alpes Maritimes, by M. Adrien Guébhard.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—The Study of "Primitive" Man: E. Clodd (Newnes).—Catalogue of the Fishes in the British Museum, 2nd edition, Vol. 1 (London).—Year-Book of the Scientific and Learned Societies of Great Britain and Ireland, 12th annual issue (Griffin).—L'Industrie Chimique: A. Haller (Paris, Baillière).—My Climbs in the Alps and Caucasus: A. F. Mummery (Unwin).—Transmissions par Cables Métalliques: H. Léaulé and A. Bérard (Paris, Gauthier-Villars).—Lessons in Elementary Physics: Prof. J. B. Stewart, new edition (Macmillan).—Agriculture, Practical and Scientific: Prof. J. Muir (Macmillan).—A Monograph of the Order of Oligochæta: F. E. Beddard (Oxford, Clarendon Press).—Fingerprint Directories: Dr. F. Galton (Macmillan).—First Principles of Astronomy: Prof. S. Cooke, 5th edition (Bell).—First Principles of Chemistry: Prof. S. Cooke, 6th edition (Bell).

PAMPHLETS.—Rapport Annuel sur l'État de l'Observatoire de Paris, 1894 (Paris).—Jamaica in 1895 (Kingston, Jamaica).—The Rise and Development of the Bicameral System in America: T. A. Moran (Baltimore).—The Pocket Gophers of the United States: V. Bailey (Washington).—The Student's Practical Chemistry: Test Tables for Qualitative Analysis: Prof. S. Cooke, 3rd edition (Bell).—Report of the Departmental Committee upon Merionethshire State Mines (Eyre and Spottiswoode).

SERIALS.—Journal of the Franklin Institute, May (Philadelphia).—Royal Natural History, Part 19 (Warne).—Aus dem Archiv der Deutschen Seewarte, xvii. Jahrg. 1894 (Hamburg).

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